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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,290	07/11/2003	Noh Yeal Kwak	29936/39480	4375
4743	7590	09/10/2004	EXAMINER	
MARSHALL, GERSTEIN & BORUN LLP 6300 SEARS TOWER 233 S. WACKER DRIVE CHICAGO, IL 60606			EVERHART, CARIDAD	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 09/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/618,290	Applicant(s) KWAK, NOH YEAL	
	Examiner Caridad M. Everhart	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6,7,9 and 10 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6 and 7 is/are rejected.
- 7) ☒ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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Applicant's arguments with respect to claims 1-4,6, and 7 have been considered but are moot in view of the new ground(s) of rejection.

Applicant has amended claim 1 and applicant's arguments are primarily based upon the limitations which were added by amendment. Applicant has also argued that the objective of the reference Drobny in the nonfinal rejection was different from applicant's objective. It is believed that the bake step would still result in diffusion processes which could be interpreted as controlling impurity concentration. Newly found references are applied below, which was necessitated by applicant's amendment .

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ries, et al (US 2002/0127766A1) in view of Downey(US 6,087,247).

Ries et al discloses providing a semiconductor wafer(first two lines of paragraph 0018). An ion implantation layer is formed(paragraph 0027, a boron doped epitaxial layer is formed). The cleaning with SC-1 is disclosed(paragraph 0030) which is disclosed to form an oxide layer. An annealing step is carried out(paragraph 0033).

Ries et al is silent with respect to the control of the dopant concentration, although Ries et al disclose the formation of an oxide layer by the SC-1 cleaning step and also discloses that the amount of out-diffusion of boron will affect the concentration of boron(paragraphs 0030 and 0027). Ries et al is also silent with respect to the implantation process and with respect to the HF.

Downey discloses that the formation of an oxide layer can be used to control the out-diffusion of boron(col. 7, lines 57-67 and col. 8, lines 1-3). Downey also discloses the implantation of boron (col. 7, lines 35-40).

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Raaijmakers, et al is relied upon for its teaching that SC1/HF bath is conventional in the art(paragraph 0064). Raaijmakers et al also discloses that the cleaning removes native oxide (paragraph 0064) as well as the formation of a new oxide layer.

It would have been obvious to one of ordinary skill in the art at the time of the invention that the boron out diffusion is controlled by the formation of the oxide in the process taught by Ries et al because Downey shows that the thickness of the oxide controls the out diffusion of boron, and the suggestion to combine the references is provided by Ries et al in the discussion of the boron out-diffusion and the growth of the oxide as a protective layer. It would have been obvious to one of ordinary skill in the art to use implantation to implant the boron because it is well known in the art that doping can be done either by in situ method or by implantation and because Downey discloses that this is a conventional method in the art(col. 1, lines 17-22). It would have been obvious to one of ordinary skill in the art at the time of the invention to have used HF in the bath taught by Ries et al because it is conventional to include HF in an SC1 bath, as taught by Raaijmakers, et al. It is also shown that the step taught by Reis et al removes the native oxide, as Raaijmaders et al teaches that the bath removes native oxide as well as forming an oxide layer.

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ries et al in view of Downey and further in view of Raaijmakers et al as applied to claim1 above, and further in view of the excerpt from Wolf et al .

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Ries et al in view of Downey further in view of Raaijmakers et al is silent with respect to the implantation energy and the angled implantation, and does not disclose the recited concentration.

Wolf is relied upon for its teaching that the recited energy is used in the art in a process in which there is thermal diffusion after the implant step (page 313, starting with "c)Predeposition implanter" and page 314, continuation of the paragraph). Wolf also teaches that it is conventional to use a tilt angle within the range recited in claim 4 (page 320, lines 6-14).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the energy and the tilt angle taught by Wolf in the method taught by Ries et al in view of Downey further in view of Raaijmakers et al because they are conventional such that they are taught in a textbook, and the energy is taught for a process such as that taught by the combined references cited above and the angle results in areas of more uniform properties as taught by Wolf on page 320 in the cited lines.

With respect to the implantation concentration, it is within the ordinary skill in the art to have chosen the implant concentration according to the device being formed, as the implantation concentration is a variable of the art.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart
9-2-04

C. Everhart
Caridad M. Everhart
Examiner